Tata Institute of Fundamental Research
Survey No. 36/P, Gopanpally Village, Serilingampally, Ranga Reddy Dist., Hyderabad – 500 046

Webinar

New way to probe defects in semiconductors

Sandip Mondal
Purdue University, West Lafayette, USA

The revolutionary impact of advanced semiconductor physics on our daily lives remains unabated. We continually interact with computational, memory, and imaging devices where a large number of electrons are pushed around various defect states at every nanosecond inside semiconductors. As these technologies are rapidly evolving from traditional circuit boards to flexible electronics, new materials, physics, and processing technologies are being explored to improve their functionality and efficiency. This brings unique experimental challenges to evaluate the fundamental interaction of defects with electrons in novel semiconductors. In this presentation, I will first discuss a prototypical MIS capacitive device architecture to illustrate the electron trapping in non-volatile memory devices fabricated at low temperatures. Unlike the conventional measurement system, I will then describe the challenges in measuring the defect state in dielectrics and my approach of probing the defect state during charge pumping operations. In the latter part, I will demonstrate a high-speed capacitance measurement system to probe the defect states as well as to decouple the memory states of these devices. Finally, I will explain the major advantage of this measurement system in terms of eliminating the contribution of substrate or interface defect states. Thus new measurement system paves the way of characterizing defect states in two-terminal MIS devices for industrial applications.

Monday, Aug 2nd 2021

5:00 PM